

Space Weather Highlights
28 July 1997 - 03 August 1997

Solar activity was very low with isolated B-class subflares the rule. A high latitude filament disappeared from the northeast quadrant on 30 July. A space-based coronagraph observed a partial-halo coronal mass ejection (angular extent > 200 degrees), mostly off the west limb, associated with the filament disappearance.

Solar wind data were received from the WIND spacecraft a few hours per day. Velocities ranged from 300 - 400 km/sec during 28 - 30 July increasing to near 500 km/sec on 31 July. Velocities remained elevated for the remainder of the period varying from 380 - 500 km/sec. Densities were mostly in the 02 - 08 p/cc range, but increased late on 30 July peaking near 50 p/cc. Density peaks near 20 p/cc were also noted on 01 and 03 August. Bz generally varied from minus 04 - plus 04 nT (GSM). However, Bz varied from minus 13 to plus 09 nT on 31 July. Solar sector orientation was not readily discernible during the period.

There were no significant proton enhancements observed at satellite altitudes.

The greater than 2 MeV electron flux at geosynchronous altitudes was at mostly normal levels.

The geomagnetic field was disturbed late 30 July through the first half of 31 July with active to minor storm levels observed. This disturbance may have been due to a high speed coronal hole windstream. Another disturbance occurred during the latter half of 03 August with active to minor storm levels noted at all latitudes and brief major storm periods observed at high latitudes. This disturbance may have been related to the coronal mass ejection mentioned above.

Space Weather Forecast
06 August 1997 - 01 September 1997

Solar activity is expected to be very low.

No significant proton enhancements are expected at satellite altitudes.

The greater than 2 MeV electron flux at geosynchronous altitudes is expected to be normal to moderate.

The geomagnetic field is expected to be predominately quiet to unsettled.



Daily Solar Data

Date	Radio Flux	Sun spot No.	Sunspot Area	X-ray Background	X-ray Flux			Flares				
	10.7 cm		(10 ⁶ hemi.)		C	M	X	S	1	2	3	4
28 July	74	26	10	A4.2	0	0	0	0	0	0	0	0
29 July	73	24	0	A5.6	0	0	0	3	0	0	0	0
30 July	71	12	0	A2.7	0	0	0	0	0	0	0	0
31 July	70	0	0	A1.1	0	0	0	0	0	0	0	0
01 August	71	0	0	<A1.0	0	0	0	0	0	0	0	0
02 August	71	11	10	A1.9	0	0	0	0	0	0	0	0
03 August	72	27	30	A1.3	0	0	0	3	0	0	0	0

Daily Particle Data

Date	Proton Fluence (protons/cm ² -day-sr)			Electron Fluence (electrons/cm ² -day-sr)		
	>1MeV	>10MeV	>100MeV	>.6MeV	>2MeV	>4MeV
28 July	2.7E+5	1.9E+4	4.8E+3		9.3E+5	
29 July	3.3E+5	1.9E+4	4.6E+3		8.7E+5	
30 July	3.7E+5	1.8E+4	4.3E+3		5.1E+5	
31 July	3.7E+5	1.8E+4	4.1E+3		5.1E+5	
01 August	2.8E+5	1.8E+4	4.3E+3		6.1E+6	
02 August	1.5E+5	1.7E+4	4.1E+3		5.4E+6	
03 August	9.3E+5	1.7E+4	3.9E+3		2.7E+6	

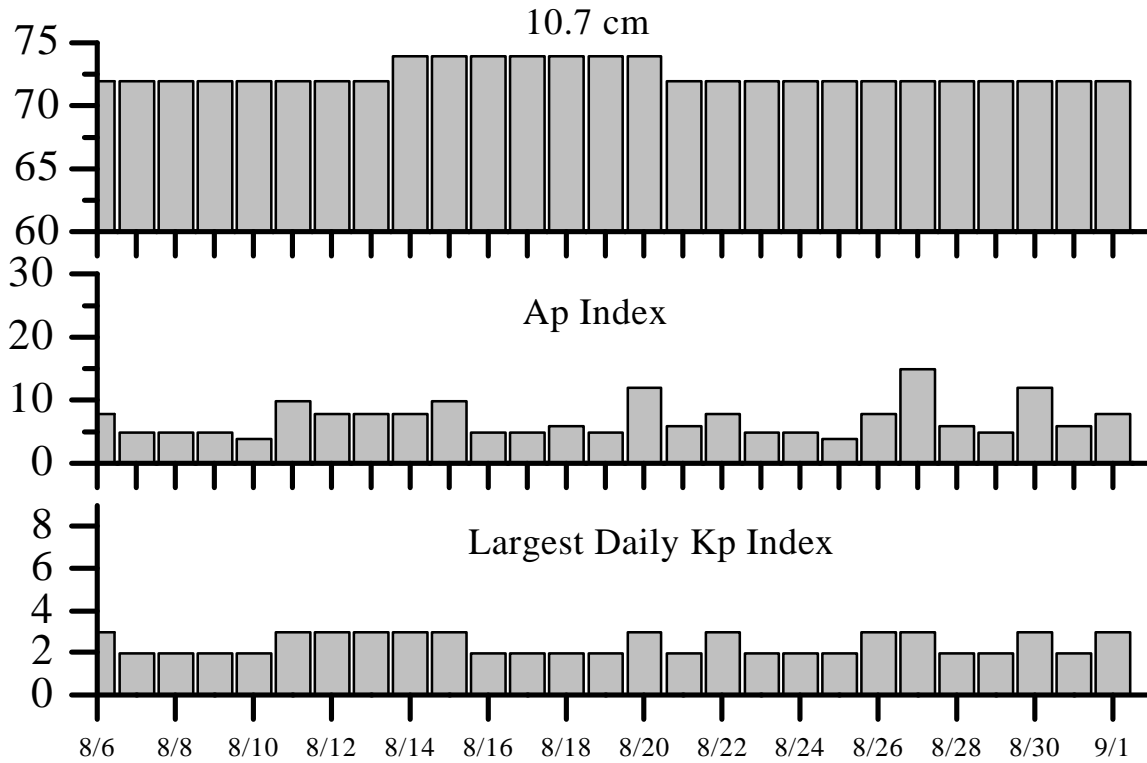
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
28 July	8	2-1-2-2-3-2-2-2	1	0-1-2-0-0-0-0-0	5	2-0-3-1-2-1-1-1
29 July	7	2-2-1-2-2-2-2-2	0	0-1-0-0-0-0-0-0	3	1-1-1-1-1-2-1-1
30 July	8	3-2-1-2-1-1-2-3	2	1-2-0-2-0-0-0-1	7	3-3-1-1-1-1-2-3
31 July	18	4-4-3-4-3-3-2-2	15	4-3-5-2-3-1-0-1	19	5-4-4-4-2-2-2-2
01 August	11	2-3-2-2-3-3-2-3	7	2-0-3-3-3-0-0-1	8	2-3-2-2-2-2-2-3
02 August	6	2-1-1-1-2-2-2-2	1	1-0-0-0-0-0-0-1	5	1-0-1-1-2-2-3-2
03 August	14	1-1-2-3-4-4-3-3	22	0-1-3-5-3-6-3-2	15	2-1-2-3-4-5-3-3

Alerts and Warnings Issued

Date and Time of Issue (UT)	Type of Alert or Warning	Date and Time of Event (UT)
31 Jul 301	K = 5 observed	31 Jul 00 - 03
31 Jul 607	K= 5 observed	31 Jul 03 - 06
31 Jul 1201	A ≥ 20 observed	31 Jul 1200





Twenty-seven Day Outlook

2Radio Flux Planetary Largest				Radio Flux Planetary Largest			
Date	10.7 cm	A Index	Kp Index	Date	10.7 cm	A Index	Kp Index
06 Aug	72	8	3	20 Aug	74	12	3
07	72	5	2	21	72	6	2
08	72	5	2	22	72	8	3
09	72	5	2	23	72	5	2
10	72	4	2	24	72	5	2
11	72	10	3	25	72	4	2
12	72	8	3	26	72	8	3
13	72	8	3	27	72	15	3
14	74	8	3	28	72	6	2
15	74	10	3	29	72	5	2
16	74	5	2	30	72	12	3
17	74	5	2	31	72	6	2
18	74	6	2	01 Sep	72	8	3
19	74	5	2				



Energetic Event

Date	Time (UT)			X-ray		Optical Information			Peak		Sweep Freq	
	Begin	Max	½	Class	Flux	Imp Brtns	Location		Radio Flux		Intensity	
			Max				Lat	CMD	245	2695	II	IV

No Event Observed

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical		Rgn #
	Begin	Max	End			Lat	CMD	
28 July	1016	1024	1033	B2.2				
	2234	2240	2243	B1.4				
29 July	0015	0019	0023	B2.6				
	0103	0109	0113	B2.0				
	0539	0544	0553		SF	N28E29	8066	
	0719	0729	0742	B4.0	SF	N22E30	8066	
	1321	1323	1333	B5.1	SF	N25E26	8066	
30 July	No Flares Observed							
31 July	No Flares Observed							
01 August	2358	0006	0021	B1.8				
02 August	No Flares Observed							
03 August	0020	0023	0034		SF	S21E45	8068	
	0303	0307	0309		SF	S25E42	8068	
	B1058	U1100	1104		SF	S21E39	8068	

Region Summary

Date	Location		Sunspot Characteristics					Flares				
	° Lat	° CMD	Area (10 ⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical	
								C	M	X	S	1

Region 8062

17 Jul	N23E66	260	0000	00	AXX	001	A							
18 Jul	N23E52	261	0000	00	AXX	001	A							
19 Jul	N23E39	261												
20 Jul	N23E26	261												
21 Jul	N23E13	261												
22 Jul	N23E00	261												
23 Jul	N27W09	256	0030	06	DRO	007	B							
24 Jul	N27W22	256	0030	06	DRO	004	B				2			
25 Jul	N28W37	258	0020	05	BXO	006	B				1			
26 Jul	N28W52	260	0010	02	AXX	003	A							
27 Jul	N28W65	260	0010	01	AXX	002	A				2			
28 Jul	N28W78	260	0000	00		000								
29 Jul	N28W91	260	0000	00		000								

0 0 0 5 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 261



Region Summary – continued.

Date	Location		Sunspot Characteristics				Flares											
	(° Lat ° CMD)	Helio	Area (10 ⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical							
		Lon						C	M	X	S	1	2	3	4			
<i>Region 8064</i>																		
22 Jul	N22E75	186	0010	00	AXX	001	A											
23 Jul	N24E61	186	0030	07	CRO	004	B											
24 Jul	N23E47	187	0040	07	CRO	004	B											
25 Jul	N22E33	188	0010	02	BXO	005	B											
26 Jul	N22E20	188	0010	03	BXO	003	B											
27 Jul	N22E04	191	0010	01	AXX	002	A											
28 Jul	N24W06	187	0010	05	BXO	005	B											
29 Jul	N23W21	189	0000	06	BXO	003	B											
30 Jul	N23W34	189	0000	00		000												
31 Jul	N23W47	189																
01 Aug	N23W60	189																
02 Aug	N23W73	189	0000	00		000												
03 Aug	N23W86	189	0000	00		000												
																		0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 191

<i>Region 8065</i>																			
24 Jul	N17W43	277	0020	04	BXO	006	B												1
25 Jul	N18W56	277	0150	08	DSO	011	BG	3											5
26 Jul	N17W70	278	0140	08	DAO	009	B												1
27 Jul	N16W82	277	0150	09	DAO	006	B												
28 Jul	N16W95	277	0000	00		000													
																			3 0 0 7 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 277

<i>Region 8066</i>																			
25 Jul	N22E73	148	0020	04	BXO	003	B												2
26 Jul	N23E59	149	0020	04	BXO	003	B												
27 Jul	N24E46	149	0010	05	BXO	003	B												1
28 Jul	N26E35	146	0000	00	AXX	001	A												
29 Jul	N27E22	146	0000	00	AXX	001	A												3
30 Jul	N24E09	146	0000	01	AXX	002	A												
31 Jul	N24W04	146																	
01 Aug	N24W17	146																	
02 Aug	N24W30	146																	
03 Aug	N24W43	146																	
																			0 0 0 6 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 146



Region Summary – continued.

Date	Location		Sunspot Characteristics				Flares							
	(° Lat ° CMD)	Helio	Area (10 ⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical			
		Lon						C	M	X	S	1	2	3

Region 8067

02 Aug	N06E65	051	0010	00	AXX	001	A										
03 Aug	N05E52	050	0000	00	AXX	001	A										
										0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 50

Region 8068

03 Aug	S22E33	069	0030	04	BXO	006	B										

Still on Disk.

Absolute heliographic longitude: 69



**Recent Solar Indices (preliminary)
of the observed monthly mean values**

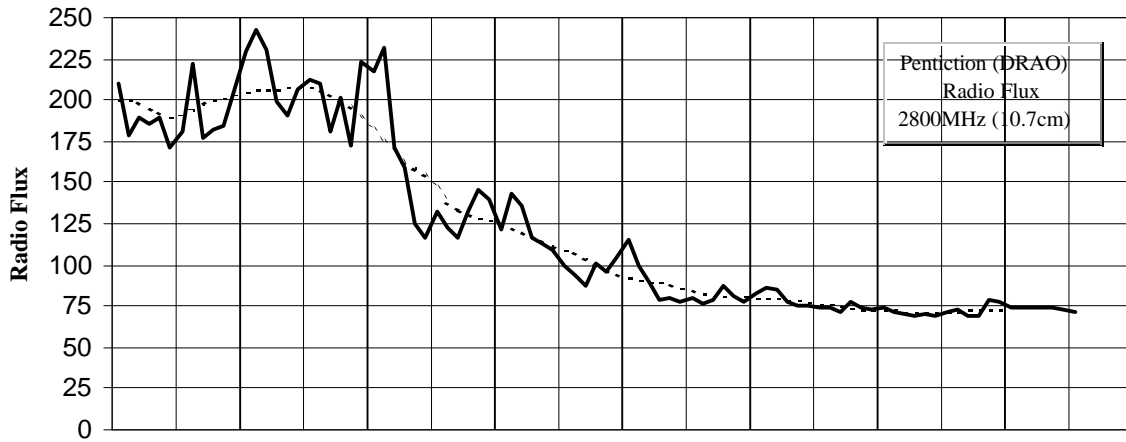
Month	Sunspot Numbers					Radio Flux		Geomagnetic	
	Observed values		Ratio	Smooth values		**Penticton	Smooth	Planetary	Smooth
	SWO	RI	RI/SWO	SWO	RI	10.7 cm	Value	Ap	Value
1995									
August	25.1	14.3	0.57	25.4	15.4	73.8	76.0	09	12.1
September	16.5	11.8	0.72	22.0	13.4	72.0	74.8	13	11.8
October	31.6	21.1	0.67	19.7	12.1	77.9	73.8	16	11.4
November	15.7	09.0	0.57	18.5	11.4	74.2	73.2	09	10.7
December	16.2	10.0	0.62	17.6	10.8	72.6	72.8	09	10.0
1996									
January	17.6	11.5	0.55	16.8	10.4	74.5	72.4	09	09.8
February	09.1	04.4	0.48	16.2	10.1	71.5	72.2	10	09.8
March	12.1	09.2	0.76	15.4	09.7	72.7	72.1	11	09.9
April	08.5	04.8	0.60	13.6	08.6	69.3	71.6	11	09.7
May	11.8	05.5	0.47	12.9	08.1*	72.1	71.4	07	09.5
June	18.8	11.8	0.63	13.5	08.6*	69.6	71.8	05	09.4
July	13.2	08.2	0.67	13.4	08.5*	71.2	72.0	07	09.3
August	20.5	14.4	0.68	13.1	08.4*	72.4	72.1	09	09.4
September	02.9	01.6	0.62	13.3	08.5*	69.4	72.3*	15	09.3*
October	02.3	01.8	0.78	14.0	09.0*	69.2	72.6*	13	09.1*
November	26.7	18.6*	0.72*	15.4	10.0*	78.7	73.0*	08	09.1*
December	21.1	12.7*	0.60*	16.2	10.6*	77.8	73.3*	07	09.3*
1997									
January	09.0	06.5*	0.72*	16.5	10.7*	74.0	73.5*	09	09.4*
February	11.3	07.6*	0.67*			73.8		11	
March	14.4	08.8*	0.61*			73.5*		08*	
April	24.5	15.8*	0.64*			74.5*		10*	
May	28.6	18.5*	0.64*			74.6*		08*	
June	22.1	13.1*	0.59*			72.4*		08*	
July	17.0	10.5*	0.62*			71.2*		07*	

*Preliminary estimates.

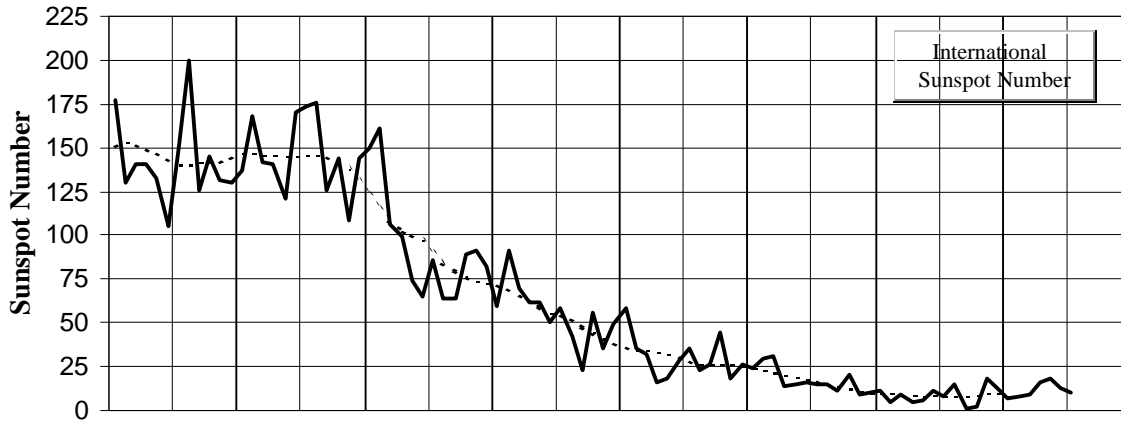
The lowest smoothed sunspot indices number for Cycle 21, RI = 12.3, occurred September 1986. The highest smoothed sunspot number for Cycle 22, RI=158.5, occurred July 1989. ** From June 1991 onward, the 10.7 cm radio flux data source is Penticton, B.C. Canada. Prior to that, it was Ottawa.



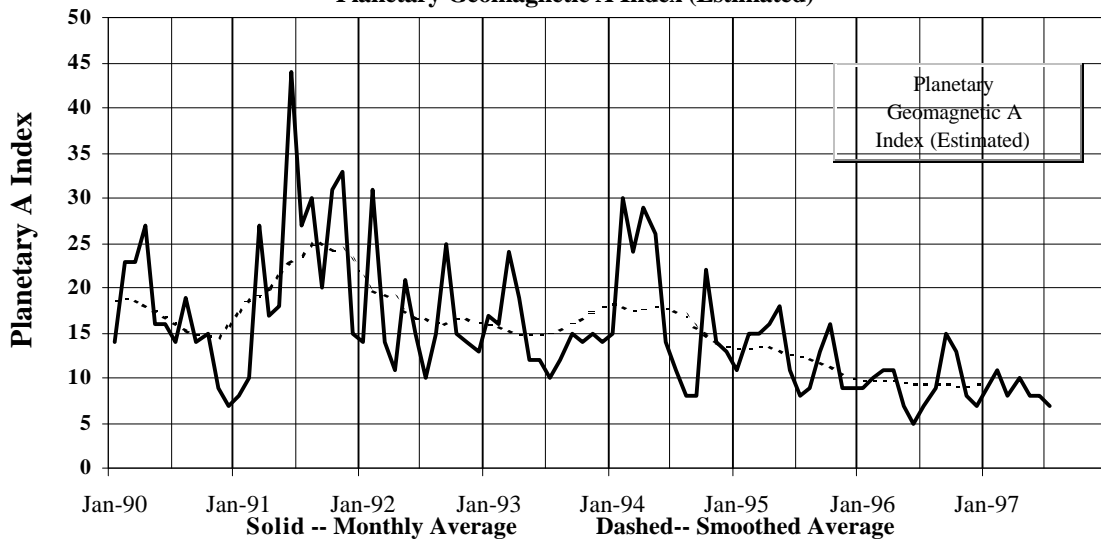
Penticton (DRAO) Radio Flux 2800MHz (10.7cm)

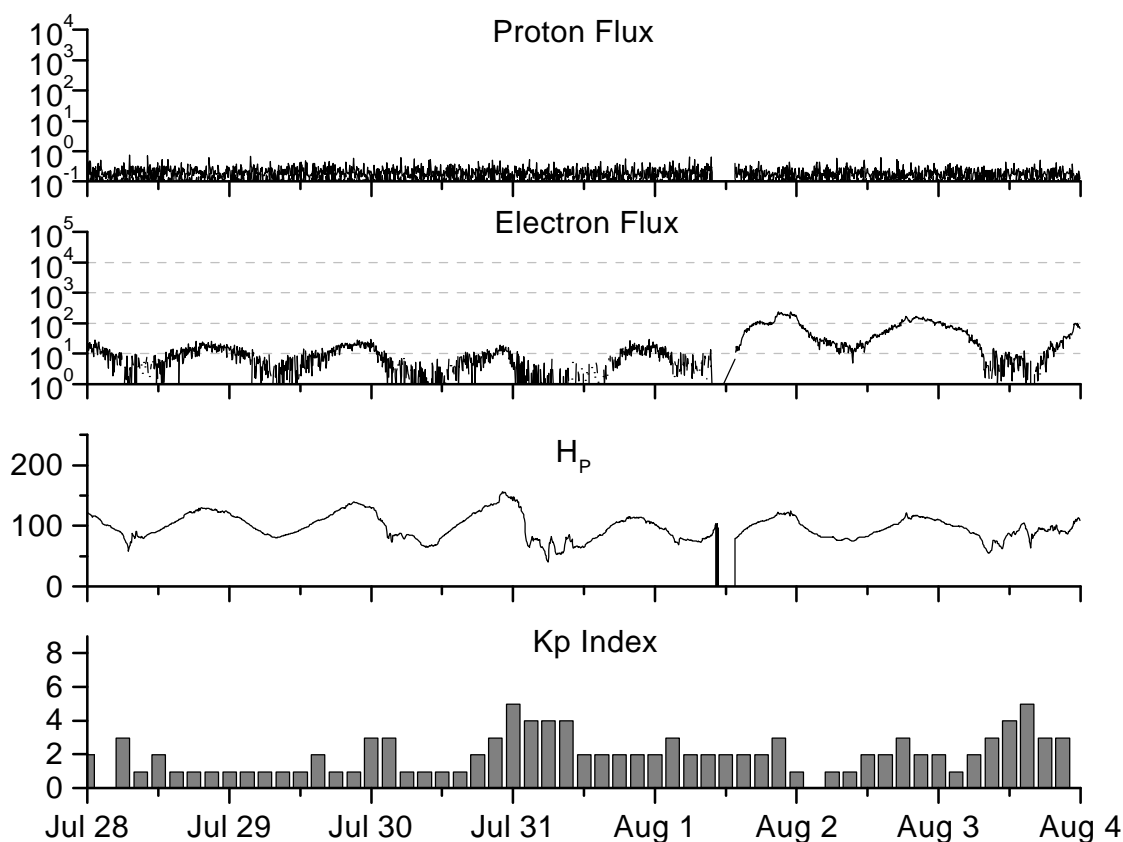


International Sunspot Number



Planetary Geomagnetic A Index (Estimated)





Weekly Geosynchronous Satellite Environment Summary

Week Beginning 28 July 1997

Protons plot contains the five minute averaged integral proton flux (protons/ cm²-sec-sr) as measured by GOES-9 (W135) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

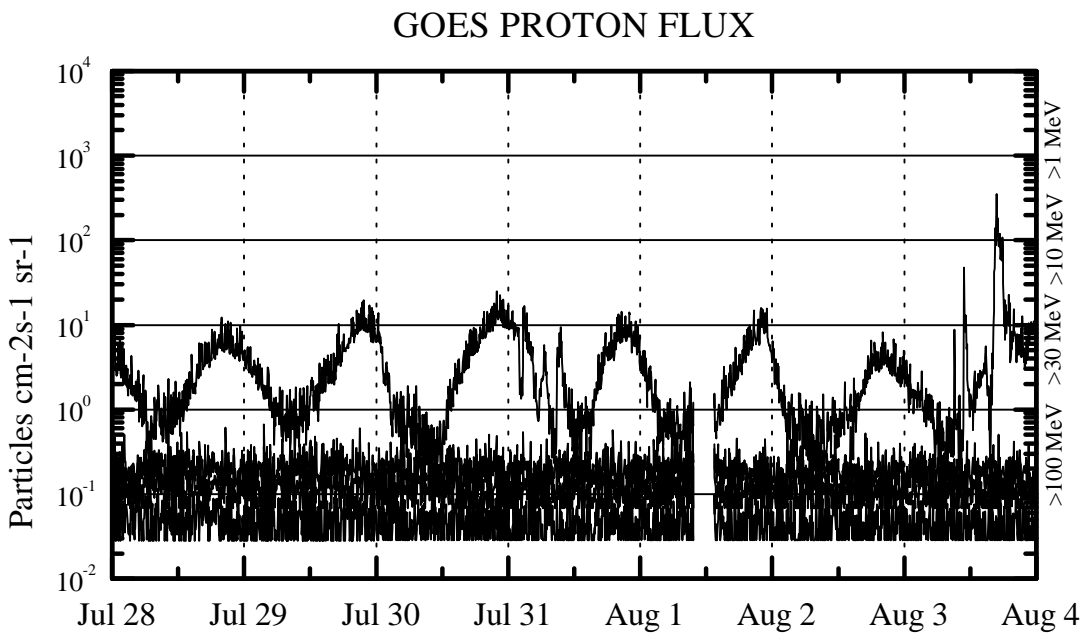
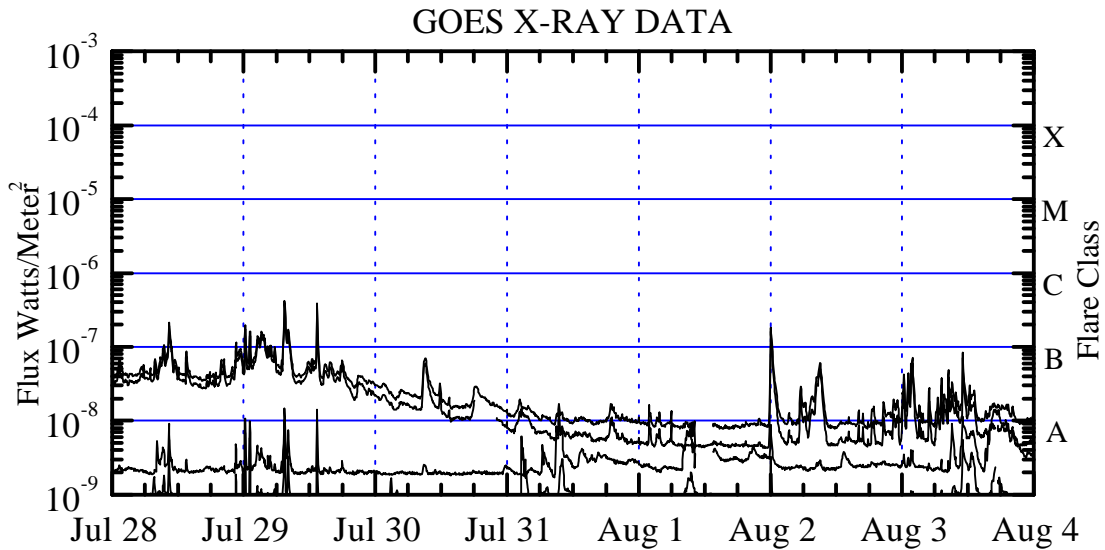
Electrons plot contains the five minute averaged integral electron flux (electrons/ cm²-sec-sr) with energies greater than 2 MeV at GOES-9.

H_p plot contains the five minute averaged magnetic field H component in nanoteslas (nT) as measured by GOES-9. The H component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

K_p plot contains the estimated planetary 3-hour K-index (derived by the USAF 55th Space Weather Squadron) in real time from magnetometers at Meanook, Canada; Sitka, AK; Glenlea, Canada; St. Johns, Canada; Ottawa, Canada; Newport, WA; Fredericksburg, VA; Boulder, CO; Fresno, CA. These data are made available through cooperation from the Geological Survey of Canada (GSC) and the US Geological Survey. These may differ from the final K_p values derived from a more extensive network of magnetometers.

The data included here are those now available in real time at the SWO and are incomplete in that they do not include the full set of parameters and energy ranges known to cause satellite operating anomalies. The proton and electron fluxes and K_p are "global" parameters that are applicable to a first order approximation over large areas. H_{parallel} is subject to a more localized phenomena and the measurements generally are applicable to within a few degrees of longitude of the measuring satellite.



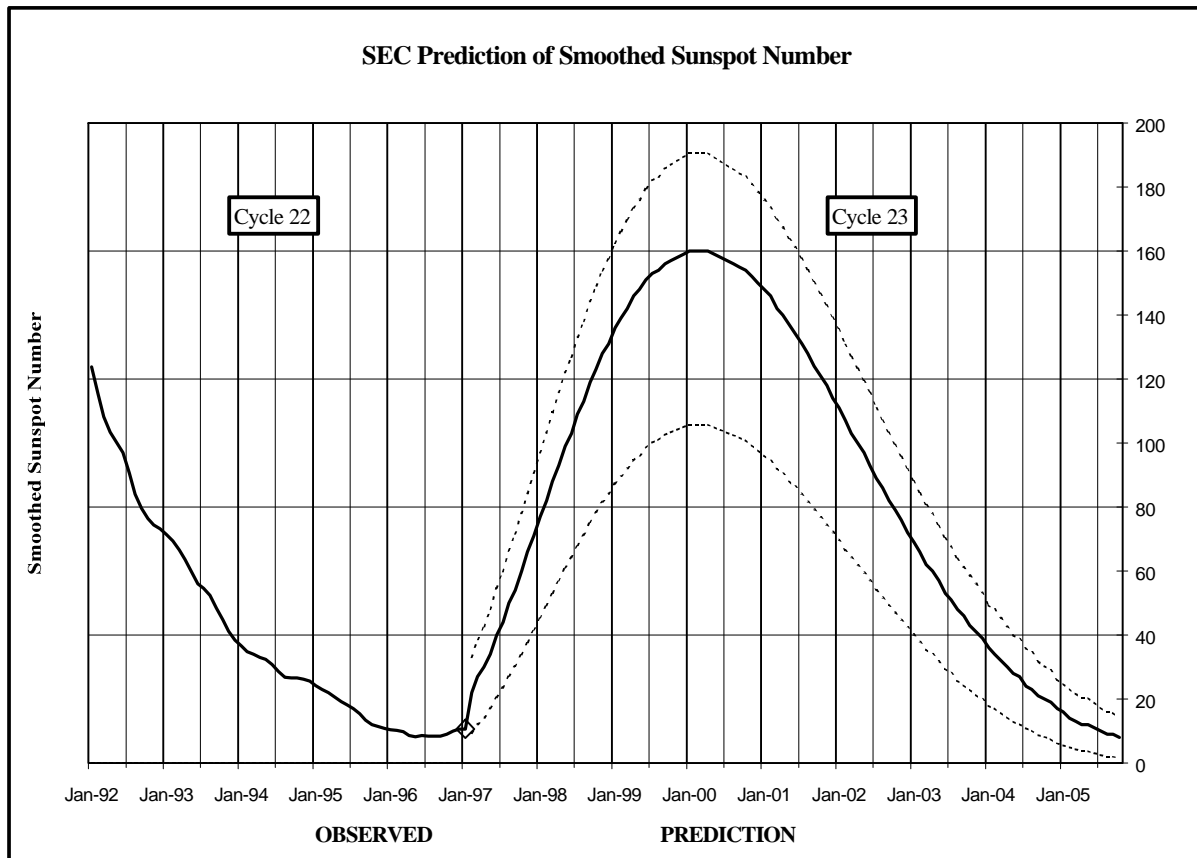


Weekly GOES Satellite X-ray and Proton Plots

Proton plot contains the five minute averaged integral proton flux (protons/ $\text{cm}^2\text{-sec-sr}$) as measured by GOES-9 (W135) for each of the energy thresholds: >1 , >10 , >30 and $>100 \text{ MeV}$. P10 event threshold is 10 pfu (protons/ $\text{cm}^2\text{-sec-sr}$) at greater than 10 MeV.

X-ray plot contains five minute averaged x-ray flux (watts/m^2) as measured by GOES 8 and 9 in two wavelength bands, .05 - .4 and .1 - .8 nm. The letters A, B, C, M and X refer to x-ray event levels for the .1 - .8 nm band.

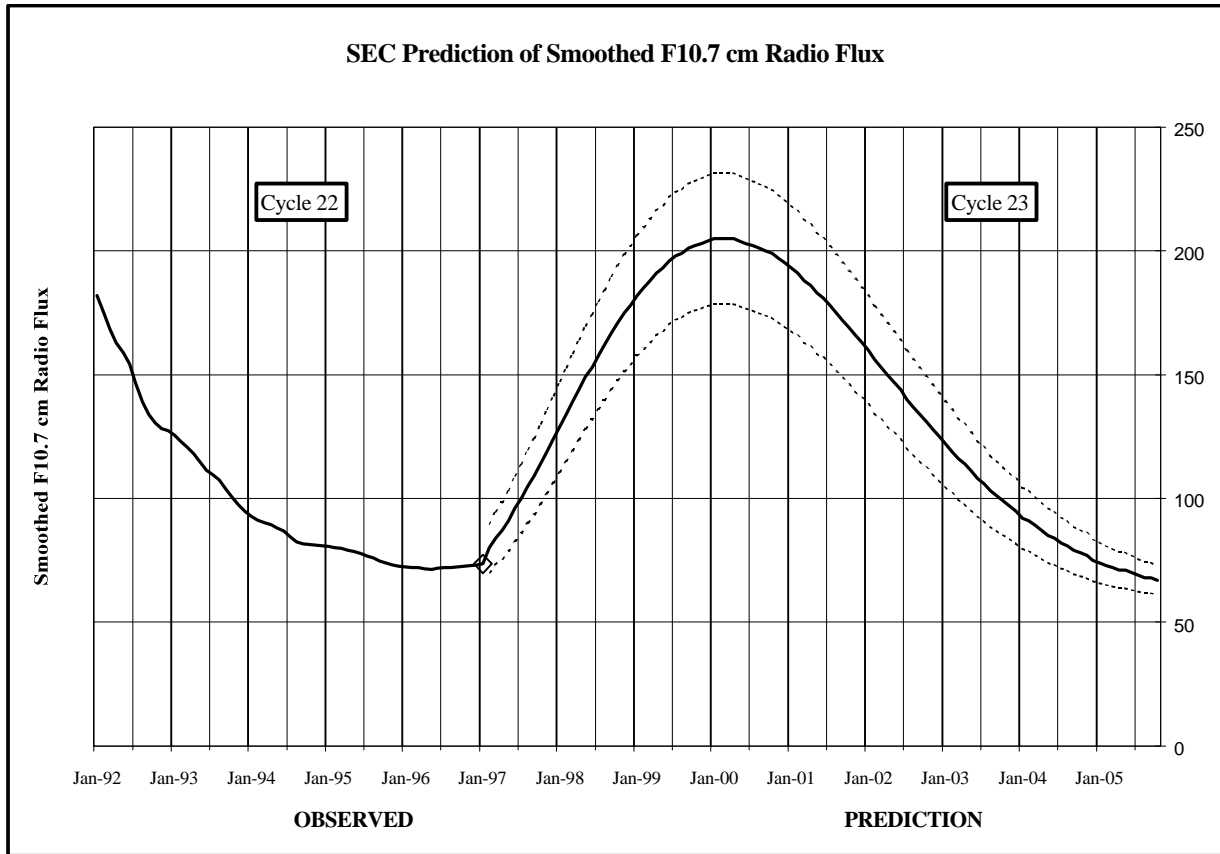




SEC Prediction of Smoothed Sunspot Number

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1996	10 (***)	10 (***)	10 (***)	9 (***)	8 (***)	9 (***)	9 (***)	8 (***)	9 (***)	9 (***)	10 (***)	11 (***)
1997	19 (10)	22 (11)	27 (12)	30 (13)	34 (14)	40 (15)	44 (16)	50 (17)	54 (18)	60 (19)	66 (20)	71 (20)
1998	77 (21)	82 (22)	88 (22)	93 (23)	99 (24)	103 (24)	109 (25)	113 (25)	119 (26)	123 (26)	128 (27)	131 (27)
1999	136 (27)	139 (28)	142 (28)	146 (29)	148 (29)	151 (29)	153 (29)	154 (29)	156 (29)	157 (29)	158 (29)	159 (29)
2000	160 (30)	160 (30)	160 (30)	160 (30)	159 (29)	158 (29)	157 (29)	156 (29)	155 (29)	154 (29)	152 (29)	150 (28)
2001	148 (28)	146 (28)	142 (28)	140 (27)	137 (27)	134 (27)	131 (27)	128 (26)	124 (26)	121 (26)	118 (25)	114 (25)
2002	111 (24)	107 (24)	103 (24)	100 (23)	97 (23)	93 (22)	89 (22)	86 (21)	82 (21)	79 (21)	76 (20)	72 (20)
2003	69 (19)	66 (19)	62 (18)	60 (18)	57 (17)	53 (17)	51 (17)	48 (16)	46 (16)	43 (15)	41 (15)	39 (14)
2004	36 (14)	34 (14)	32 (13)	30 (13)	28 (12)	27 (12)	24 (11)	23 (11)	21 (11)	20 (10)	19 (10)	17 (9)
2005	16 (9)	14 (9)	13 (8)	12 (8)	12 (8)	11 (8)	10 (7)	9 (7)	9 (7)	8 (6)	** (***)	** (***)





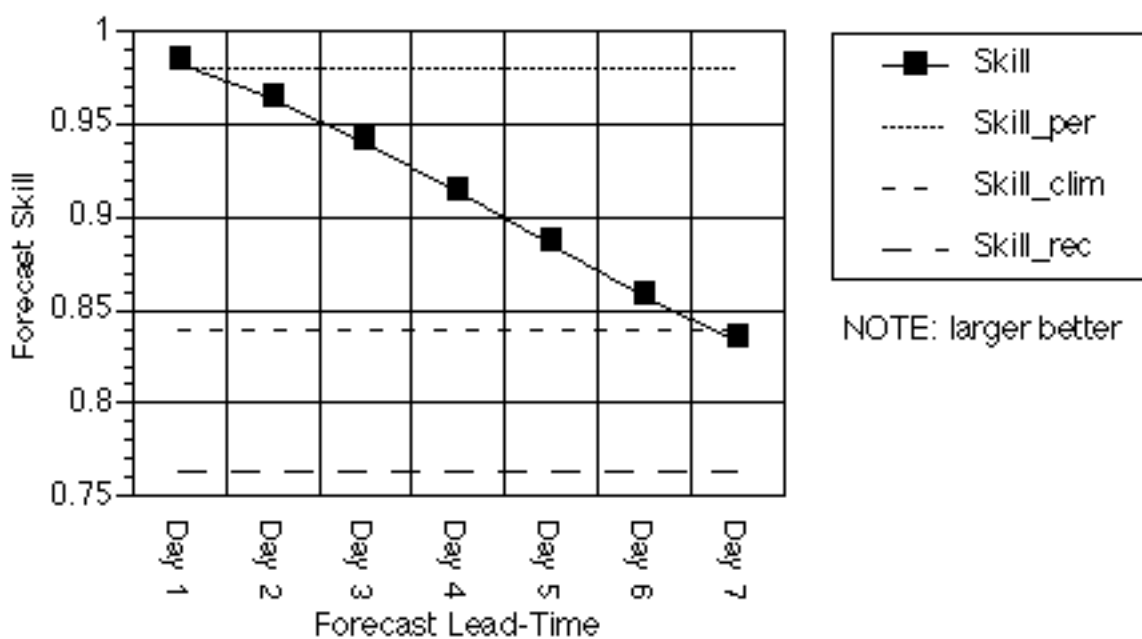
SEC Prediction of Smoothed F10.7cm Radio Flux

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1996	72 (***)	72 (***)	72 (***)	72 (***)	72 (***)	71 (***)	72 (***)	72 (***)	72 (***)	73 (***)	73 (***)	73 (***)
1997	77 (9)	80 (10)	84 (11)	87 (11)	91 (12)	96 (13)	100 (14)	105 (15)	109 (15)	114 (16)	119 (17)	124 (18)
1998	129 (18)	134 (19)	139 (20)	144 (20)	149 (21)	153 (21)	158 (22)	162 (22)	167 (23)	171 (23)	175 (23)	178 (24)
1999	182 (24)	185 (25)	188 (25)	191 (25)	193 (25)	196 (26)	198 (26)	199 (26)	201 (27)	202 (27)	203 (28)	204 (28)
2000	205 (30)	205 (30)	205 (30)	205 (30)	204 (30)	203 (28)	202 (27)	201 (27)	200 (26)	199 (26)	197 (26)	195 (26)
2001	193 (25)	292 (25)	188 (25)	186 (25)	183 (24)	181 (24)	178 (24)	175 (24)	172 (23)	169 (23)	166 (23)	163 (22)
2002	160 (22)	156 (22)	153 (21)	150 (21)	147 (21)	144 (21)	140 (20)	137 (20)	134 (19)	131 (19)	128 (18)	125 (18)
2003	122 (17)	119 (17)	116 (17)	114 (16)	111 (16)	108 (15)	106 (15)	103 (14)	101 (14)	99 (14)	97 (13)	95 (13)
2004	92 (12)	91 (12)	89 (12)	87 (11)	85 (11)	84 (11)	82 (10)	81 (10)	79 (10)	78 (9)	77 (9)	75 (9)
2005	74 (8)	73 (8)	72 (8)	71 (7)	71 (7)	70 (7)	69 (7)	68 (6)	68 (6)	67 (6)	** (***)	** (***)



Verification of SEC Forecasts

Forecast Type ⁽³⁾	Verification Statistics ⁽¹⁾			Event Climatology ⁽²⁾		
	Bias ⁽⁴⁾	Accuracy ⁽⁵⁾	Skill ⁽⁶⁾	Quarter	1-year	5-year
M Flares	0.010	0.025 (0.16)	-0.16	0.022	0.014	0.076
X Flares	0.010	0.000 (0.01)	***	0	0.003	0.003
Proton Events	0.010	0.000 (0.01)	***	0	0	0.004
10.7 cm Flux	0.32	4.6 (2.1)	0.62	73.7	73.5	89.5
A _{fred} Index	-0.32	37.5 (6.1)	-0.16	9.3	9.5	11.8
A _p Index	0.81	61.2 (7.8)	-0.06	8.9	8.8	12.3



Forecast skill with respect to climatology as a function of lead-time for 10.7cm Solar Flux forecasts, 1989–1996. The horizontal dashed lines indicate the skill of 1-day persistence, 30-day short-term climatology, and 27-day recurrence forecasts.

- (1) Verification statistics for the calendar quarter ending 6/30/97.
- (2) Climatology is the average occurrence of the event during the indicated period.
- (3) Next-day probability forecasts of flares and proton events, and next-day integer forecasts of A-index and 10.7 cm flux.
- (4) Forecast reliability, or bias, as measured by the mean error (forecast – observed).
- (5) Forecast accuracy as measured by the mean square error and, in parentheses, the root mean square error.
- (6) Forecast skill with respect to the climatology of the event (positive values are better; negative values are worse).
- (7) Missing values (***) due to the non-occurrence of the event during the quarter.

NOTE: Additional verification results can be found on SEC's World Wide Web server (<http://www.sec.noaa.gov>).

